LLNL **Lessons Learned** LLNL

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Do Not Modify Seat Belts

Lawrence Livermore National Laboratory (LLNL) Fleet Management personnel have noted several instances in which seat belts in government vehicles have been tampered with. Paper clips, binder clips, and specially-machined pieces of metal have been found shoved into seat belt buckles in order to disengage the vehicle's seat belt alarm (see figure 1). Seat belts have also been found pulled across the driver's seat and buckled into the passenger seat's latch. In some cases, seat belts have been damaged and have had to be replaced.

Seat belts are designed to prevent internal injuries by spreading the force of a collision across the body's strongest areas: the hips, shoulders, and upper chest. Seat belts help *belted* drivers maintain control of the car by keeping them in the driver's seat and preventing ejection from the vehicle.

> **Note: Wearing seatbelts is required by the California Vehicle Code and is enforced onsite. Document 21.3, "Vehicle Operations and Traffic" in the** *LLNL ES&H Manual* **states: "Seat belts shall be used by the driver and all occupants of a motor vehicle. The driver shall ensure that occupants wear their seat belts."**
>
> **Tampering, disabling, or otherwise modifying a seatbelt or airbag system is grounds for disciplinary action.**

Drivers and passengers who disable seat belts are exposing themselves to more risk than they may realize. Air bags are designed to work *with, not instead of***,** seat belts. Individuals not wearing their lap and shoulder belts and/or who are riding less than 10 inches from the air bag housing can receive serious or even fatal injuries from deployed air bags. Since frontal air bags only deploy in frontal crashes, seat belts are needed in side and rear collisions and in rollover accidents, when frontal air bags do not inflate. Airbags do not prevent drivers and passengers from being thrown from the car.

In addition, tampering with the seat belt buckle may prevent the vehicle's restraint control module from receiving the necessary information to determine the force of air bag deployment in a crash, which could result in serious injury from airbag inflation. The National Highway Traffic Safety Administration (NHTSA) has developed advanced frontal air bag requirements. Advanced frontal air bags, which were phased into new model year 2004 vehicles, use sensors to detect occupant weight, seat belt use, and seat position to determine the force with which the frontal air bags deploy. All new passenger vehicles will have advanced frontal air bags by model year 2007.

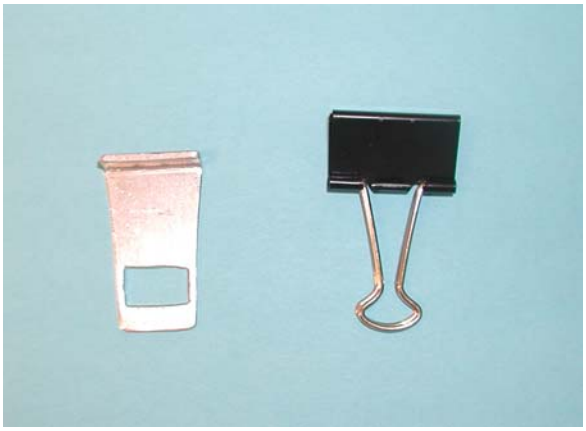

Figure 1. Items used to disarm seat belts.

Analysis

- Air bags are designed to work *with, not instead of*, seat belts. Tampering with a seat buckle could result in serious injury.
- The new advanced frontal air bag systems automatically determine if and with what level of power the frontal air bags will inflate. The appropriate level of power is based upon sensor inputs that can typically detect: 1) occupant size, 2) seat position, 3) seat belt use, and 4) crash severity. The first two inputs are directly related to seat belt use.
  - **Occupant (sensed) weight is determined using pressure sensors in the seat cushion, weight sensors between the seat and the floor and/or by measuring seat belt tension.**
  - **Belt use sensors determine whether an occupant is belted or not. Since an unbelted occupant needs the protection of an air bag at lower speeds than a belted occupant does, the air bag would deploy at a lower threshold for an unbelted occupant.**
  - Seat position sensors determine where a seat is adjusted on its track. An advanced air bag system is designed so a dual-stage air bag deploys at a lower level when the seat is all the way forward than it does when the seat is farther back. This benefits shorter drivers who move their seats all the way forward.
  - Crash severity sensors measure the severity of a crash. If a relatively low severity crash is sensed, only the lowest stage of a dual-stage inflator will fill the air bag; if a more severe crash is sensed, both stages will fill the air bag, inflating it at a higher level.

Recommended Action for LLNL Employees

1. Wear seat belts! It is the law, it is an LLNL ES&H Policy, and it can save you from serious injury or death in the event of a vehicle accident.
2. Never modify a seat belt buckle to avoid using the seat belt.
3. If you find a modified seat belt buckle in a lab government vehicle:
   - Do not use the vehicle. Post the vehicle (or key) as out of service.
   - Do not try to remove the modified unit.
   - Report the modification to Fleet Management to request an evaluation of the integrity of the seat belt.
4. Never slip the diagonal belt behind your body — the lap belt alone cannot prevent you from being thrown forward or ejected from the vehicle.
5. Ensure that your belt fits snugly against your body. If it is too loose, you could be injured as you are thrown against the belt in an accident
6. If you are the driver, ensure that all occupants of the vehicle are wearing their seat belts.

Where to Get Help or More Information

- The NHTSA website at http://www.safercar.gov/airbags/index.html

Search Categories: Transportation.

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